Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
Wireless Operations in the 3650-3700 MHz Band	)	ET Docket No. 04-151
Rules for Wireless Broadband Services in the 3650-3700 MHz Band	)	WT Docket No. 05-96
Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band	)	ET Docket No. 02-380
Amendment of the Commission's Rules With Regard to the 3650-3700 MHz Government Transfer Band	)	ET Docket No. 98-237

To: The Commission

REPLY OF BRN PHOENIX, INC. TO OPPOSITIONS TO PETITIONS FOR RECONSIDERATION

BRN Phoenix, Inc. ("BRNP"), by its attorney and pursuant to Section 1.429(g) of the Commission's Rules, 47 C.F.R. § 1.429(g), hereby submits its Reply to the Oppositions to Petitions for Reconsideration filed by Motorola, Inc. ("Motorola"),[1] the Wireless Communications Association International, Inc. ("WCA"),[2] and the Satellite Industry Association ("SIA")[3] (collectively "Oppositions"). In pertinent part, these Oppositions oppose various aspects of BRNP's Petition for Partial Reconsideration, filed on June 10, 2005 ("Petition").[4] As they relate to BRNP's Petition, the Oppositions consist of inaccurate

[1] See Opposition of Motorola, Inc., ET Docket No. 04-151 (August 11, 2005).
[2] See Consolidated Opposition and Comments to Petitions for Reconsideration, ET Docket No. 04-151 (August 11, 2005).
[3] See Oppositions to Petitions for Reconsideration and Comments of the Satellite Industry Association, ET Docket No. 04-151 (August 11, 2005).
[4] See Petition for Partial Reconsideration of BRN Phoenix, Inc, ET Docket No. 04-151 (June 10, 2005). On August 18, 2005, BRNP, pursuant to Section 1.46 of the Commission's Rules, filed a Motion for Extension of Time to file this Reply until September 6, 2005 ("Motion"). Upon filing the Motion, BRNP notified the other parties to this

statements, which, if adopted by the Commission, would result in heightened barriers to entry by small businesses, and inefficient use of the 3.65 GHz spectrum. Accordingly, to the extent they oppose BRNP's Petition, the Oppositions should be denied.

I. Background

In the FCC Order at issue in BRNP's Petition and the Oppositions, the Commission adopted rules for the nationwide licensing of terrestrial operations in the 3650-3700 MHz ("3.65 GHz") band.[5] According to the Commission, the main purpose of the rules it adopted is to allow for the rapid implementation of wireless broadband deployment in the 3.65 GHz band, and provide opportunities for the introduction of new wireless broadband services and technologies to all Americans, especially those living in rural areas and other underserved areas.[6]

To that end, the Commission adopted a streamlined licensing process, and recommended that all terrestrial operations in the 3.65 GHz band use technology with contention-based protocol ("CPB").[7] The Commission listed certain important characteristics that CBP would need to incorporate if it is to be used in the 3.65 GHz band: (1) it would have to permit all users to have a reasonable opportunity to operate, so that no operator can block others' access to the spectrum; and[8] (2) it should have no unpredictable delays when a transmitter waits until a given channel is idle.[9] The Commission also stated that advanced antennas should be used to create highly

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proceeding, and the appropriate Commission staff. No one raised an objection to BRNP's Motion. Accordingly, this Reply is timely filed.

[5] In the Matter of Wireless Operations in the 260-3700 MHz Band, Rules for Wireless Broadband Services in the 3650-3700 MHz Band, Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band, Amendment of the Commission's Rules With Regard to the 3650-3700 MHz Government Transfer Band, Report and Order and Memorandum Opinion and Order, FCC 05-56, ET Docket Nos. 04-151, 02-380, 98-237, WT Docket No. 05-96 (Rel. March 16, 2005).

[6] See Order at ¶¶ 2, 13.

[7] Id. at ¶ 16.

[8] Id. at ¶¶ 2, 13.

[9] Id. at ¶ 57.

efficient networks in the 3.65 GHz band.[10]

In its Petition, BRNP requested partial reconsideration of the Order, only to the extent necessary to permit the Commission to designate the advanced antenna system method ("AAS Standard"), as described in Section 8.4.4.7 of the existing IEEE Standard 802.16-2004, using orthogonal frequency division multiple access ("OFDMA") modulation, as the contention-based protocol ("CBP") for use with equipment operating in the 3.65 GHz band.[11] BRNP explained that the AAS Standard meets the Commission's requirements for CPB, and is publicly disclosed within an existing international IEEE Standard.[12]

BRNP also explained that adaptive antennas at base stations and narrowbeam antennas at end-user devices allow for more effective spectrum use (by making it possible to reuse a given frequency to communicate with different overlapping paths, and to reduce the probability of harmful interference to fixed satellite earth stations); hence, their use should be encouraged.[13] To that end, BRNP suggested that the EIRP limit set in Section 90.1321 of the Commission's Rules could be increased for those types of antennas.[14]

Motorola, SIA, and WCA oppose certain aspects of BRNP's Petition. They contend that: (a) BRNP's suggested AAS Standard CPB has "unresolved technical issues" involving user coordination;[15] (b) patent issues would make it difficult to use the AAS Standard;[16] and (c) the Commission should not permit the increase of the EIRP limits due to the potential of harmful

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[10] Id. at ¶ 53.
[11] See Petition at 1-2.
[12] Id. BRNP also explained that it owns a patent regarding certain elements of the AAS Standard, and that it is BRNP is willing to waive the license fee to permit fixed applications within this band.
[13] Id. at 9-10.
[14] Id.
[15] See Motorola Opposition at 3-4.
[16] Id.; WCA Opposition at 14-15.

interference to fixed satellite service earth stations.[17] As shown in BRNP's Petition and discussed herein, those allegations are incorrect.

II. The AAS Standard Permits Multiple Users Access to the 3.65 GHz Band and Increases Spectral Efficiency

Motorola contends that any CPB, including the AAS Standard, will "reduce system throughput" due to problems with coordinating users of the 3.65 GHz spectrum, and other interference issues.[18] For the same reason, Motorola also advocates an exclusive licensing approach for the 3.65 GHz band.[19]

Motorola's comments are inaccurate. As BRNP explained in its Petition, the AAS Standard includes a "built in" CPB that would permit multiple operators to have simultaneous access to the 3.65 GHz spectrum while utilizing null steering to remove co-channel interference generated by other operators' transmissions.[20] This simultaneous access/interference protection would be achieved by using AAS and the OFDMA modulation as described in Section 8.4.4.7 of IEEE Std. 802.16-2004.[21]

System throughput is significantly increased several fold by the AAS Standard. The AAS Standard increases the number of logical request and grant sub-channels through multi-beam AAS, thus assuring contention-free control of the data sub-channels, i.e., no unpredictable transmission delays while waiting for an idle channel.[22] A random back-off mechanism is included as a "back up" for the bandwidth request/grant sub-channels.[23]

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[17] See SIA Opposition at 11-12.
[18] See Motorola Opposition at 4-5.
[19] Id.
[20] See Petition at 5.
[21] Id. citing IEEE 802.16 Standard for Local and Metropolitan Area Networks Part 16: Air Interface for Fixed Broadband Wireless Access Systems, § 8.4.4.7 (Oct. 2004).
[22] Id. at 7 citing § 6.3.8 IEEE 802.16 Standard.
[23] Id.

Moreover, by using OFDMA, which sub-divides a signal into sub-channels (with each sub-channel being allocated to a subscriber), AAS permits combining sub-channels from various carriers, which permits each subscriber to be treated separately independent of location, distance from the base station and power requirements.[24]

Accordingly, the AAS Standard not only coordinates users, but it does so in a manner that increases the overall spectral efficiency of the 3.65 GHz band, which comports with the purpose of this rulemaking. By enhancing spectral efficiency as much as five to ten times, multiple operators may use the 3.65 GHz band simultaneously, thus ensuring competitive service to the public.

Motorola's comments concerning exclusive licensing in the 3.65 GHz band should also be rejected. As the Commission stated, its proposed streamlined licensing process will help to speed wireless broadband services to all areas of the U.S., including rural areas.[25] If the Commission were to adopt exclusive licensing in this band, barriers to entry for many small entities, including wireless Internet service providers ("WISPs") would be increased, as those entities would have to compete against well-financed, large telecommunications entities in spectrum auctions or engage in other forms of expensive licensing procedures. Conversely, the Commission's proposed streamlined licensing approach will permit easy access to spectrum for WISPs and other small entities, and the resulting lower barriers to entry will, a priori, lower the threshold for wireless broadband deployment, resulting in wireless access in less populated areas where citizens have been heretofore disenfranchised. Non-exclusive licensing is a central, stated and laudable objective of the Commission, and reversing this Commission decision would eviscerate the main achievement of the Commission's rulemaking.

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[24] Id. at 5.

III. Patent Issues Will Not Interfere With Implementation of Wireless Broadband Services Using the AAS Standard

WCA and Motorola express concern about BRNP's "partial patent" of the proposed technology.[26] These entities contend that BRNP has not made enough information public about AAS and that therefore they cannot assess AAS as a "technological solution."[27] WCA and Motorola also are concerned about possible license fees.[28] Those fears are unfounded.

The definition of the AAS Standard in IEEE 802.16-2004, Section 8.4.4.7, is a product of the efforts of many individuals and companies working in the IEEE 802.16 working group over a period of several years. The AAS Standard is a publicly available protocol. BRNP's proposed AAS CBP has been fully ratified by IEEE members from around the world and is part of the ratified IEEE 802.16-2004 standard. While BRNP and other contributing companies are entitled to license fees for technology they have contributed to the IEEE 802.16, BRNP made clear during its discussion with the Commission, which it publicly disclosed, that if: (a) the EIRP requirements are modified as requested; (b) BRNP's proposed protocol, the AAS protocol, is adopted as a CPB method, and (c) the 3.65 GHz band is used to increase the availability of spectrum to smaller entities such as WISPs, and to provide wireless communications capacity to underserved Americans; then BRNP will forgo any fees associated with equipment designed, built and deployed in 3.65 GHz Band within the U.S.

Regarding WCA's suggestion that BRNP has refused to make BRNP's contention methods publicly available; that is untrue. BRNP's proposal is based on the IEEE 802.16 standard using the OFMDA PHY and AAS option for CBP, which is publicly available. Also, it

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[25] See Order at ¶ 16.
[26] See Motorola Opposition at 3-4; WCA Opposition at 14-15
[27] Id.
[28] Id.

is unclear why the WCA thinks that this 802.16 standard is exclusive BRNP technology. The standard is the work product of many companies and individuals working in the standards groups for over five years. The contention methods, as part of the IEEE 802.16-2004 standards, and are there for all to see.

IV. Increasing the EIRP for Advanced Antennas Will Not Cause Harmful Interference to FSS Earth Stations or Other Spectrum Users

SIA claims that any proposed increase in power levels for mobile units and/or base stations would increase the potential for harmful interference with fixed satellite system ("FSS") earth stations.[29] SIA's specific concerns are: (a) increased power level could cause interference directed at FSS earth stations; and (b) mobile units operating closer to earth stations would purportedly result in significantly reduced attenuation of potential interference.[30]

BRNP is certainly committed to preventing interference to FSS earth stations and other spectrum users. It is for that reason that BRNP is recommending a method that will actually decrease the interference footprint area ("FPA") by using directional antennas.[31]

The effect of directional antennas as proposed by BRNP[32] can be easily confirmed by the Commission's technical specialists by appealing directly to first principles of wireless propagation. This technique for interference suppression is well known, and has been used by the Commission repeatedly, most recently in its rule making for the 2.5 GHz BRS/ERS bands.[33]

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[29] See SIA Opposition at 11.
[30] Id.
[31] See Petition at 10.
[32] Id. at 9-10.
[33] See Amendment of Parts 1, 21, 73, 74 & 101 of the Commission's Rules to Facilitate Provision of Fixed and Mobile Broadband Access, Educational, and Other Advanced Services in the 2150-2160 MHz and 2500-2650 MHz Bands, 19 FCC Rcd 14165, ¶¶ 121-130 (2004).

Specifically, BRNP recommends that the EIRP be increased by –10log (horizontal beamwidth/360), where horizontal beamwidth is measured at the –3 dB points in the azimuth plane. Directional antennas reduce the FPA where the field strength may be strong enough to interfere with another system.

As an example, a 90 degree sectored antenna has 6 dB more gain than an equivalent omni-directional antenna. Because ground-based propagation decays at 12 dB for every doubling of distance, the 90 degree sectored antenna produces the same field strength at $1.4*R_{omni}$ compared to the omni-directional antenna at range R_{omni}. For the omni antenna, the area $A_{omni} = 3.14* R_{omni} * R_{omni}$. For the sectorized antenna, the area $A_{90} = 3.14* 1.4*R_{omni} * 1.4*R_{omni}/4$. The factor of 4 in the denominator arises because only $1/4^{th}$ of the area is actually energized. Simplifying the result, $A_{90} = A_{omni}/2$, thus reducing the interference area by a factor of 2 using a sectorized 90 degree antenna. Extending this result to a 22.5 degree antenna (very common in this frequency band), $A_{22.5} = A_{omni}/4$.

The Commission has encouraged the use of new and novel antenna technologies that foster more intensive spectrum use.[34] BRNP's proposal will serve that purpose by allowing more efficient spectrum use through greater spectrum reuse, while at the same time reducing the FPA.

VI. Conclusion

For all the foregoing reasons, the Oppositions of Motorola, SIA, and WCA should, to the extent they oppose BRNP's Petition, be denied, and BRNP's Petition should be granted. Additionally, BRNP reiterates its request that, if the Commission requires additional time to

[34] See Order at ¶¶ 53-54.

deliberate on the permanent standard for CPB, it be granted waiver of Section 90.203(o)(1) of the Commission's Rules to the extent necessary for BRNP to certify equipment utilizing the AAS Standard for CPB.[35] As BRNP stated in its Petition, it is completing its development of equipment that will be utilized to meet the Commission's goals in this proceeding.[36] Hence, the public interest will be served by grant of BRNP's waiver request, as it will, in accordance with the Commission's goals, speed wireless broadband service to the public, particularly those in rural and other underserved areas.[37]

Respectfully submitted,

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[35] See Petition at 11-12.
[36] Id.
[37] Id.

CERTIFICATE OF SERVICE

I, Elaine Simons, a legal assistant in the law firm of Venable LLP, on behalf of BRN Phoenix, Inc., hereby certify that on this 6th day of September 2005, copies of the foregoing Reply of BRN Phoenix, Inc. to Oppositions to Petitions for Reconsideration were served via First Class Mail, postage prepaid, on the following individuals:

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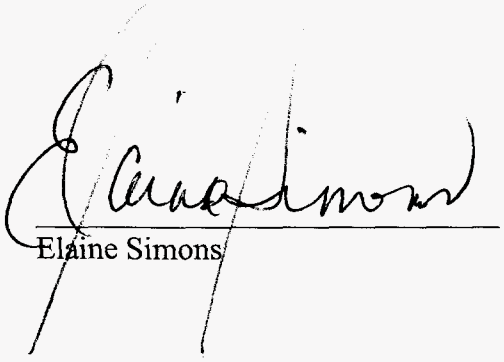

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